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TITLE: UNIVERSAL CARTRIDGE FOR A MIXER FAUCET

BACKGROUND OF THE INVENTION

In the technical practice, valve battery insertion assemblies called cartridges are already known which implement the tasks of closing and opening the cold- and warm-water inlet pipelines, the mixing of cold- and warm water as well as the routing of the mixed water to the outlet of the valve battery in a single structural assembly, the so-called cartridge.

In their basic design, these cartridges include a cartridge casing bordered with a base, an inlet disc fixed inside the cartridge casing as well as a control disc suitable to be displaced and rotated on the inlet disc on the side opposite to the base.

The control disc is driven through a ceramic moving element by means of a driving arm pivoted in the lever holder.

The lever holder supporting the driving arm is arranged in the cartridge casing so as to allow it to be rotated.

In the inlet disc and the control disc, appropriate bores and holes are shaped for the purpose of controlling the inlet of cold- and warm water as well as the outlet of mixed water.

The cartridges of simpler design described above are widely used; in fact, they are capable of fulfilling the basic

functions expected of a cartridge used in valve batteries, even without any addition.

There are, however, an increasing demand for cartridges to fulfil other functions as well.

The functions required most frequently are the pressure equalization, the use of non-return valves and the reversibility.

The pressure equalization of both the cold water and warm water is a very important task; otherwise, any sudden change in the [presure] pressure of either inlet branch would result in scalding and cold water shock, respectively, to the user.

Pressure reduction of cold water inlet occurs frequently if a cold water consumer device e.g. toilet rinsing tap is mounted near the mixing valve; in fact, its operation results in sudden decrease in the cold water support pressure which, in turn, causes the sudden rise of mixed water temperature from the cartridge without pressure equalization.

The non-return valves are necessary in installations where the possibility exists that water from the branch of higher pressure flows to that of lower pressure when the cartridge is open.

The possibility of reversion is necessary to allow the cartridge to be connected to an unusual cold water and warm water supply arranged e.g. on two sides of a bathroom wall.

According to the present state of technique, various solutions of the above tasks are known.

The USA patent description No. 5.725.010 describes a pressure equalizer and mixing valve battery in which the pressure equalizer assembly is arranged in the [valva] valve battery body between the traditional cartridge and the water inlet pipes.

The patent application No. EP 0559998 also describes a cartridge with pressure equalization. Its essence is, that the base of the traditional cartridge is provided with a protrusion which includes a seat arranged perpendicular to the symmetry axis of the cartridge, and a pressure equalizer is arranged perpendicular to the symmetry axis of the cartridge in the said seat.

Usually, the non-return valves are mounted directly on the inlet pipelines themselves; thus, according to the traditional practice, they are not integrated into the cartridge.

For the solution of reversion, the USA patent No. 4.676.270 is known, where the reversion is performed by a cylinder which is mechanically independent of the cartridge.

The patent application No. EP 0771980 also describes a solution in which the structural elements of various function are fastened by means of connecting elements to the relevant cartridge casing.

The application No. EP 0 684 416 discloses a cartridge, where in the base of the cartridge there are formed two separated and partly widened conducting openings, separately for the cold and warm water, further in the widened part of each opening there is arranged a back-flow preventer valve, both of them can be manufactured integrally.

This solution is excellent, when the two separate inserts do not have to communicate with each other, however cannot be used if the two separate inserts have to communicate with each other, or have to be connected to each other.

An unfavorable feature of the above solutions is that they are task-specific; this means that the base of cartridge shall be designed according to the task.

In order to eliminate the above unfavorable features, the present invention is aimed at establishing a solution which, without any special technical knowledge, can be used universally for providing the cartridges known in themselves with elements of various additional functions.

This invention is aimed at implementing a cartridge which ensures quickly and safely that, by using cartridges known in themselves and elements performing various additional functions, an arrangement integrated simply and quickly can be established.

According to the present invention, the above task is solved by means of an universal mixing valve battery cartridge -

used primarily for mixing cold water and warm water - which has two discs arranged one above the other to form a plane sealing together, being the lower disc a stationary inlet disc and the upper disc a control disc suitable to be displaced and rotated on the inlet disc; where said control disc is in mechanical connection with a driving arm pivoted in a lever holder - through a ceramic moving element as the case may be - and the lever holder is arranged in the cartridge casing that allows it to be rotated; while [a part of the cartridge casing - preferably its base - is provided with a connection place on the side opposite to the inlet disc to accommodate several insertion pieces - preferably of various function - where its hole suitable to accommodate the insertion pieces is arranged essentially in the direction opposite to the base of cartridge.] on the base of the cartridge a connection place is formed or arranged for the reception of at least one insertion piece, further the opening for the admission of the insertion piece of the connection place is formed principally in a direction which is parallel with the longitudinal axis of the cartridge, whereas the connection place is an outwardly directed sleeve, arranged or formed on the base, wherein the cold and warm water inlet formed in the base are ending.

In a preferred embodiment of the mixing valve battery cartridge according to the invention, the insertion piece [is

arranged - at least in part - between the valve battery casing and the connection place] , which is partly arranged in the connection place, is partly arranged between the valve battery casing and the connection place.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The valve battery cartridge according to the invention is described in detail, based on the exemplary embodiment indicated in the Figures annexed.

Fig. 1 shows the basic type of the cartridge according to the invention in side sectional view with an insertion piece.

Fig. 2 shows the basic type of the cartridge according to the invention in side sectional view without an insertion piece.

Fig. 3 shows the side view of the basic type of cartridge according to the invention.

Fig. 4 shows the bottom view of the basic type of cartridge according to the invention.

Fig. 5 shows the design of the standard insertion piece for the cartridge according to the invention.

Fig. 6 shows the design of the pressure equalizer insertion for the cartridge according to the invention.

Fig. 7 shows the design of the reverting insertion piece for the cartridge according to the invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As shown in Fig. 1 that, in the [12] valve battery body 12 of a valve battery, a [3] casing 3 is arranged, which accommodates a [2] lever holder 2 so as to allow its rotation.

The [2] lever holder 2 holds the [1] driving arm 1 pivoted on the [7] rotational axis 7, being said [1] driving arm 1 in connection through the [4] ceramic moving element 4 with the [5] control disc 5.

The [5] control disc 5 is arranged on the [6] inlet disc 6 in which holes are shaped for the inlet of cold water and warm water as well as outlet of mixed water.

The [6] inlet disc 6 is arranged on the [9] base 9 connected to the [3] casing 3, where the [9] base 9 includes the [14] connection place 14 to accommodate the [10] insertion piece 10.

In the holes of the [9] base 9 and the [6] inlet disc 6, the [8] rubber sealing 8 is arranged while between the [12] valve battery body 12 and the [3] casing 3, and the [10] insertion piece 10 and the [9] base 9 as well as the other end of the [10] insertion piece 10 and the [12] valve battery body 12, the [11] seals 11 are arranged. In the [12] valve battery body 12, the [13] connection ducts 13 are shaped.

Fig. 2 shows the valve battery cartridge of Fig. 1 without the [10] insertion piece 10.

Fig. 3 shows the side view of the cartridge of Fig. 1.

Fig. 4 shows the bottom view of the [9] base 9.

The [10] insertion piece 10 shown in Fig. 1 is suitable to be used for straight passage. The [10] insertion piece 10 shown in Fig. 6 is designed as a pressure equalizer insertion piece. The [10] insertion piece 10 shown in Fig. 7 is designed as a reverting insertion piece.

The function of the cartridge according to the invention is described below in detail.

As shown in Fig. 1, by actuating the [1] driving arm 1, the relative position of the [5] control disc 5 and the [6] inlet disc 6 can be changed through the [4] ceramic moving element 4.

By shutting off and bypassing the holes in the [6] inlet disc 6 by means of the [5] control disc 5, the temperature and flow of water outlet via the opening shaped in the [9] base 9 to the [12] valve battery body 12 can be changed in a manner known in itself.

The [10] insertion piece 10 arranged in the [14] connection place 14 parallel to the axis of the cartridge ensures the connection between the [13] connection ducts 13 shaped in the [12] valve battery body 12 and the inlet holes of [9] base 9, while the [11] seals 11 arranged between the [12] valve battery body 12 and the [10] insertion piece 10 ensure the leakage-free



isolation between these connecting ducts and the inner space of [12] valve battery body 12.

Thus, in the [3] casing 3 of cartridge known in itself, the cold water and warm water flows from the [13] connecting ducts 13 of the [12] valve battery body 12 through the current [10] insertion piece 10 to the holes shaped in the [9] base 9 of the cartridge and, then, to the bores and holes of the [6] inlet disc 6.

By changing the [10] insertion piece 10, the cartridge provided with the [10] insertion piece 10 is capable of fulfilling various functions; thus, the [10] insertion piece 10 shown in Fig. 5 implements a simple inlet, the [10] insertion piece 10 shown in Fig. 6 implements pressure equalization while the [10] insertion piece 10 shown in Fig. 7 implements the inversion of water inlet.

The [10] insertion pieces 10 are always inserted parallel to the longitudinal axis of cartridge into the [14] connection place 14; thus, the [11] seals 11 are under pressure when the cartridge is mounted in the [12] valve battery body 12 and ensure sufficient sealing.

The advantage of the cartridge according to the invention is that, by changing the [10] insertion piece 10 that requires no special skill, the function of the cartridge can be

arbitrarily specified and changed by using the [10] insertion  
pieces 10 available.



## Universal cartridge for a mixer faucet

**Subject of the invention:** Universal cartridge for a mixer faucet

In the technical practice, valve battery insertion assemblies called cartridges are already known which implement the tasks of closing and opening the cold- and warm-water inlet pipelines, the mixing of cold- and warm water as well as the routing of the mixed water to the outlet of the valve battery in a single structural assembly, the so-called cartridge.

In their basic design, these cartridges include a cartridge casing bordered with a base, an inlet disc fixed inside the cartridge casing as well as a control disc suitable to be displaced and rotated on the inlet disc on the side opposite to the base.

The control disc is driven through a ceramic moving element by means of a driving arm pivoted in the lever holder.

The lever holder supporting the driving arm is arranged in the cartridge casing so as to allow it to be rotated.

In the inlet disc and the control disc, appropriate bores and holes are shaped for the purpose of controlling the inlet of cold- and warm water as well as the outlet of mixed water.

The cartridges of simpler design described above are widely used; in fact, they are capable of fulfilling the basic functions expected of a cartridge used in valve batteries, even without any addition.

There are, however, an increasing demand for cartridges to fulfil other functions as well.

The functions required most frequently are the pressure equalization, the use of non-return valves and the reversibility.

The pressure equalization of both the cold water and warm water is a very important task; otherwise, any sudden change in the pressure of either inlet branch would result in scalding and cold water shock, respectively, to the user.

Pressure reduction of cold water inlet occurs frequently if a cold water consumer device e.g. toilet rinsing tap is mounted near the mixing valve; in fact, its operation results in sudden decrease in the cold water supply pressure which, in turn, causes the sudden rise of mixed water temperature from the cartridge without pressure equalization.

The non-return valves are necessary in installations where the possibility exists that water from the branch of higher pressure flows to that of lower pressure when the cartridge is open.

The possibility of reversion is necessary to allow the cartridge to be connected to an unusual cold water and warm water supply arranged e.g. on two sides of a bathroom wall.

According to the present state of technique, various solutions of the above tasks are known.

The USA patent description No. 5.725.010 describes a pressure equalizer and mixing valve battery in which the pressure equalizer assembly is arranged in the valva battery body between the traditional cartridge and the water inlet pipes.

The patent application No. EP 0559998 also describes a cartridge with pressure equalization. Its essence is, that the base of the traditional cartridge is provided with a protrusion which includes a seat arranged perpendicular to the symmetry axis of the cartridge, and a pressure equalizer is arranged perpendicular to the symmetry axis of the cartridge in the said seat.

Usually, the non-return valves are mounted directly on the inlet pipelines themselves; thus, according to the traditional practice, they are not integrated into the cartridge.

For the solution of reversion, the USA patent No. 4.676.270 is known, where the reversion is performed by a cylinder which is mechanically independent of the cartridge.

The patent application No. EP 0771980 also describes a solution in which the structural elements of various function are fastened by means of connecting elements to the relevant cartridge casing.

An unfavourable feature of the above solutions is that they are task-specific; this means that the base of cartridge shall be designed according to the task

In order to eliminate the above unfavourable features, the present invention is aimed at establishing a solution which, without any special technical knowledge, can be used universally for providing the cartridges known in themselves with elements of various additional functions.

This invention is aimed at implementing a cartridge which ensures quickly and safely that, by using cartridges known in themselves and elements performing various additional functions, an arrangement integrated simply and quickly can be established.

According to the present invention, the above task is solved by means of an universal mixing valve battery cartridge - used primarily for mixing cold water and warm water - which has two discs arranged one above the other to form a plane sealing together, being the lower disc a stationary inlet disc and the upper disc a control disc suitable to be displaced and rotated on the inlet disc; where said control disc is in mechanical connection with a driving arm pivoted in a lever holder - through a ceramic moving element as the case may be - and the lever holder is arranged in the cartridge casing that allows it to be rotated; while a part of the cartridge casing - preferably its base - is provided with a connection place on the side opposite to the inlet disc to accommodate several insertion pieces - preferably of various function - where its hole suitable to accommodate the insertion pieces is arranged essentially in the direction opposite to the base of cartridge.

In a preferred embodiment of the mixing valve battery cartridge according to the invention, the insertion piece is arranged - at least in part - between the valve battery casing and the connection place.

The valve battery cartridge according to the invention is described in detail, based on the exemplary embodiment indicated in the Figures annexed.

- Fig. 1 shows the basic type of the cartridge according to the invention in side sectional view with an insertion piece.
- Fig. 2 shows the basic type of the cartridge according to the invention in side sectional view without an insertion piece.
- Fig. 3 shows the side view of the basic type of cartridge according to the invention.
- Fig. 4 shows the bottom view of the basic type of cartridge according to the invention.
- Fig. 5 shows the design of the standard insertion piece for the cartridge according to the invention.
- Fig. 6 shows the design of the pressure equalizer insertion for the cartridge according to the invention.
- Fig. 7 shows the design of the reverting insertion piece for the cartridge according to the invention.

As shown in Fig. 1 that, in the 12 valve battery body of a valve battery, a 3 casing is arranged, which accommodates a 2 lever holder so as to allow its rotation.

The 2 lever holder holds the 1 driving arm pivoted on the 7 rotational axis, being said 1 driving arm in connection through the 4 ceramic moving element with the 5 control disc.

The 5 control disc is arranged on the 6 inlet disc in which holes are shaped for the inlet of cold water and warm water as well as outlet of mixed water.

The 6 inlet disc is arranged on the 9 base connected to the 3 casing, where the 9 base includes the 14 connection place to accommodate the 10 insertion piece.

In the holes of the 9 base and the 6 inlet disc, the 8 rubber sealing is arranged while between the 12 valve battery body and the 3 casing, and the 10 insertion piece and the

9 base as well as the other end of the 10 insertion piece and the 12 valve battery body, the 11 seals are arranged. In the 12 valve battery body, the 13 connection ducts are shaped.

Fig. 2 shows the valve battery cartridge of Fig. 1 without the 10 insertion piece.

Fig. 3 shows the side view of the cartridge of Fig. 1

Fig. 4 shows the bottom view of the 9 base.

The 10 insertion piece shown in Fig. 1 is suitable to be used for straight passage.

The 10 insertion piece shown in Fig. 6 is designed as a pressure equalizer insertion piece.

The 10 insertion piece shown in Fig. 7 is designed as a reverting insertion piece.

The function of the cartridge according to the invention is described below in detail.

As shown in Fig. 1, by actuating the 1 driving arm, the relative position of the 5 control disc and the 6 inlet disc can be changed through the 4 ceramic moving element.

By shutting off and bypassing the holes in the 6 inlet disc by means of the 5 control disc, the temperature and flow of water outlet via the opening shaped in the 9 base to the 12 valve battery body can be changed in a manner known in itself.

The 10 insertion piece arranged in the 14 connection place parallel to the axis of the cartridge ensures the connection between the 13 connection ducts shaped in the 12 valve battery body and the inlet holes of 9 base, while the 11 seals arranged between the 12 valve battery body and the 10 insertion piece ensure the leakage-free isolation between these connecting ducts and the inner space of 12 valve battery body.

Thus, in the 3 casing of cartridge known in itself, the cold water and warm water flows from the 13 connecting ducts of the 12 valve battery body through the current 10



insertion piece to the holes shaped in the 9 base of the cartridge and, then, to the bores and holes of the 6 inlet disc

By changing the 10 insertion piece, the cartridge provided with the 10 insertion piece is capable of fulfilling various functions; thus, the 10 insertion piece shown in Fig. 5 implements a simple inlet, the 10 insertion piece shown in Fig. 6 implements pressure equalization while the 10 insertion piece shown in Fig. implements the inversion of water inlet.

The 10 insertion pieces are always inserted parallel to the longitudinal axis of cartridge into the 14 connection place; thus, the 11 seals are under pressure when the cartridge is mounted in the 12 valve battery body and ensure sufficient sealing.

The advantage of the cartridge according to the invention is that, by changing the 10 insertion piece that requires no special skill, the function of the cartridge can be arbitrarily specified and changed by using the 10 insertion pieces available.

## List of elements

- 1 driving arm
- 2 lever holder
- 3 casing
- 4 ceramic moving element
- 5 control disc
- 6 inlet disc
- 7 rotational axis
- 8 rubber sealing
- 9 base
- 10 insertion piece
- 11 seal
- 12 valve battery body
- 13 connection ducts
- 14 connection place